

# Bats, most diverse and cosmopolitan mammals of the San Juan Islands, WA, are residents and active year-round.

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The San Juan Islands have been separated from mainland Washington State and British Columbia by several miles of salt water since they emerged from beneath the last continental glaciation approximately 9,000 years ago. Isolation by water is a barrier to colonization by animals that neither swim nor fly.

In fact, out of 49 native mammals recorded in western Washington, only 23 have ever been reported in the islands, of which two (wolves, elk) have been locally extinct for more than a century. Rodents are the largest mammalian group on the mainland, followed closely by bats. In the islands, bats comprise nearly half of the mammal species, with nine or possibly 10 species to rodents' three.<sup>1</sup>

We have polled landowners, conducted visual surveys of bat roosts, and carried out extensive acoustical surveys of woodlands, wetlands and meadows in the San Juan Islands since 2010 with a view to determining (1) whether bats are distributed unevenly among islands and habitats; (2) whether bats migrate, hibernate, or remain active in the islands during the winter months; and (3) how much island bats rely on colonizing human structures such as homes and barns for maternity roosts.

Incidental to our investigation of these questions, we have sought to learn more about the health of island bats from visual observations and from injured and dead bats submitted by homeowners to licensed wildlife rehabilitators. At the time of this writing no island bat has tested positive for rabies, which is present in mainland bats a few miles distant. This suggests that island bats travel rarely to the mainland, and that the islands may offer refuge from pathogens afflicting neighboring bat populations.

## Methods

An SM2BAT+ ultrasound recorder (Wildlife Acoustics, Maynard MA) was deployed at 33 locations on the three largest ferry-connected islands over a total of 81 nights between March and September 2014. In December 2014, a weatherproof SM3BAT recorder was installed on a tree at Entrance Mountain, Orcas Island, with a Plexiglas rain shield over the microphone, and began continual nightly recording. Additional recordings were made with the SM2BAT+ recorder in autumn 2014 and winter 2015 at Hummel Lake, Lopez Island, on 20 nights when weather permitted.

## Notes

1. Keen's bat, which can only be distinguished genetically from the Long-Eared Myotis, has been not yet been confirmed in the islands.

Recorded calls were analyzed with Kaleidoscope software (Wildlife Acoustics, Maynard MA) and identified where possible to species.

Acoustic data were compared with records of bat roosting or other activity from 151 cooperating homeowners and farmers in San Juan County. This was considered of particular importance in assessing the distribution of Townsend's Big Eared Bats (COTO), which are reputedly difficult to identify acoustically. In fact, visual contacts with COTO were proportionally much greater and widespread than acoustic records suggested.

## Results

A total of 10,063 passes were recorded in 2014. Nine species were represented in these records (Figure 1) including five *Myotis* species: California Myotis (MYCA), Yuma Myotis (MYYU), Little Brown Myotis (MYLU), Long-Eared Myotis (MYEV) and Long-Legged Myotis (MYVO). Four larger bats were also heard: Hoary Bat (LACI), Silver-Haired Bat (LANO), Big Brown Bat (EPFU), and Townsend's Big-Eared Bat (COTO). This is consistent with the results of a weeklong 2013 survey of Lopez island by Rowan, Williams, Barsh, Murphy and Sauter (unpub.).

The same species were heard on all three islands but species were not evenly distributed among islands (Figure 2). Yuma Myotis (MYYU) were proportionately most abundant on Lopez, Little Browns (MYLU) on Orcas, and the larger bats on San Juan Island. These differences are not explained by differences between the islands in habitat availability. Like Rowan et al., we found no strong association of island bat species with particular types of habitats with the exception of California Myotis, which were heard most often in meadows and woodlands, not wetlands. California Myotis were roughly equally represented on all three islands studied.

A total of 2,563 passes were recorded at Hummel Lake from September 2014 to March 2015 when weather permitted (20 nights), and 1,784 passes were recorded at Entrance Mountain from January to March 2015 (72 nights).

At Hummel Lake, where we recorded 300-500 passes per night in summer, bat activity fell sharply in the fall (Figure 3); no recordings were made in December because of severe windy, wet weather. Activity increased sharply in February. At Entrance Mountain, where recordings were made nightly, mid-winter bat activity was greater than at Hummel and increased less sharply between January to March (Figure 4).

Our data suggest that while bats may nearly disappear from wetlands and open water in winter they may relocate to wooded areas that are more sheltered and where there is a plentiful supply of winter moths (*Xyleneni*)—a pattern we have observed for insectivorous birds such as Winter Wrens, Kinglets, and Pine Siskins.

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